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IS IT TIME TO USE THE RIGHT SIDE OF OUR BRAIN?
A COMPARISON OF ANALYTICAL AND NATURALISTIC
DECISION MAKING PROCESSES


By

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Maritime Operations.

The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

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ABSTRACT

As commanders, how do we make decisions? In scientific theory, there are two methods or models for the decision-making processes – the Analytical Decision-Making (ADM) model and the Naturalistic, or Recognition, Decision-Making (NDM) model.

The time one has to make a decision within a certain situation will influence the decision making process. With the factor of time most prevalent in this situation, a greater emphasis should be placed on intuitive decision-making processes.

In developing intuition, commanders can gain a supportive experience base by immersing themselves in numerous decision-making situations. Over time, simulations expand a commander's pattern recognition ability, thus improving his intuitive decision making skills.

In a final analysis, the operational commander makes decisions dependent on the situation he is facing. I contend that commanders of today and future commanders need to understand and incorporate the intuitive Naturalistic Decision-Making process. The intuitive decision-making inherent in the Naturalistic Decision-Making process provides a sound basis for determining a proper course of action for a given situation.

This paper is not designed to espouse that analytical decision-making processes be forgotten, but illustrates that every decision is determined by a situation.

INTRODUCTION

As commanders, how do we make decisions? Physiological analysis shows that the left side of the brain performs logic functions, such as, analysis, mathematics, and language. The right side of the brain controls imaginative, creative, and intuitive thinking. From the day of commissioning, junior officers are taught to make decisions analytically, weighing every option, and eliminating all distracters before choosing the best course of action. Over time, the acquisition of knowledge and experience provides the backbone of their decision making process. This analytical approach to problem solving cultivates a finer development of the left side of the brain, leaving little time for mental activities that stimulate the creative, intuitive side of the brain.

As we move into this millennium, the process of decision-making is getting faster and faster. The speed of war is increasing at an exponential rate. We, as a cadre of military minds, are often asked to "think outside the box." The problem lies in that "thinking outside the box" requires the imagination, creativity, and intuition that have been, for the most part, ignored during the training of our decision-making processes. Now is the time to examine other possibilities and use the right side of our brain.

The objective of this paper is to describe various decision-making models, defining the advantages and disadvantages of each. Additionally, it will examine the effect of intuition on commanders' decisions, and make recommendations for developing intuition as a tool for problem solving.

DISCUSSION

In scientific theory, there are two methods or models for the decision-making processes – the Analytical Decision-Making (ADM) model and the Naturalistic, or Recognitional, Decision-Making (NDM) model. The Analytical Decision-Making model holds that decision-making is a rational and systematic process of analysis based on the concurrent comparison of multiple options.¹ The Naturalistic Decision-Making model is based on a qualitative assessment of the situation based on the decider's judgment and experience.² The distinction between the two often becomes muddled in the attempt to capture the essence of the definitions by coining new phrases or buzzwords, such as, "coup d'oeil", "eagle's glance", or "fingerspitzengefühl".

There are distinct advantages and disadvantages to each method and differing circumstances dictate the proper use. An understanding of the decision making process is necessary not only for the explanation of individual behavior, but also for the behavior of complex organizations in unique situations.³ Masterful decision-making is essential for success on the battlefield. Understanding the factors that influence the process and utilizing existing decision making models can assist commanders in achieving their goals.⁴

ANALYTICAL DECISION-MAKING (ADM)

Now the elements of the art of war are first, measurement of space; second, estimation of quantities; third, calculations; fourth, comparisons; and fifth, chances. Quantities derive from measurement, figures from quantities, comparisons from figures, and victory from comparisons.

- Sun Tzu

Analytical Decision-Making (ADM) is based on the analysis of a situation using deductive logic and probability theory. It asserts that we must always generate options

systematically, identify criteria for evaluating these options, assign weights to the evaluation criteria, rate each option on each criterion and tabulate the scores to find the best option. Analytical decision-making uses a scientific, quantitative approach, and to be effective, it depends on a relatively high level of situational certainty and accuracy.⁵ Grounded in logic, this model can eliminate bias and intangible factors and provide for conformity. With such conformity, it can easily be put into computer models and taught to the most novice decisionmakers. Moreover, given accurate information and clearly defined goals it can provide excellent results that can be documented and justified. In research literature, this process is known as multi-attribute utility analysis (MAUA).⁶ The appeal of analytical decision-making is that, as long as we have accurate information and do the analysis properly, it guarantees that we will reach the best possible decision.⁷ It is a better decision-making process when an optimal solution is required.

A major disadvantage of ADM is the large amount of time required to process all the information and evaluate all the possible courses of action. Additionally, to improve the confidence of the evaluation an increasing amount of information should be gathered. This only lengthens the time required to conduct the analysis. A classic example of this type of model is the Deliberate Planning Process, including the Commanders Estimate of the Situation (CES) espoused in today's Joint Doctrine.

NATURALISTIC DECISION-MAKING (NDM)

A good plan violently executed Now is better than a perfect plan next week.
- Gen. George S. Patton, Jr.

Naturalistic decision-making (NDM) started in the 1970s when cognitive psychologists began in earnest to question the classical decision making model and started

studying how experienced decisionmakers made decisions in “real life” situations or “naturalistic” conditions.⁸ NDM emphasizes intuition and situational awareness. It is structured toward conditions characterized by the following attributes: ill-structured, situation-unique problems; uncertain, dynamic environments; shifting, ill-defined or competing goals; lack of information; ongoing action with continuous feedback loops; high-level stress and friction; and time stress.⁹ These characteristics are typical in any military decision process across the spectrum from the tactical to the operational and strategic levels.

When faced with these characteristics, many adroit commanders rely on their experience and intuition to recognize the situation as familiar. They use important cues or pattern recognition to recognize the situation and envision what is next. They respond accordingly with a course of action that is likely to succeed, based these recognitional factors. This is called a “Recognition-Primed Decision (RPD) model” as illustrated in Table 1.¹⁰

The Recognition-Primed Decision (RPD) model fuses two processes: the way decisionmakers size up the situation to recognize which course of action makes sense, and the way they evaluate that course of action by imagining it.¹¹ It is important to note that with RPD decisionmakers are looking for a course of action that works, not necessarily the best option. In many cases, the first course of action that works is the best option. This strategy is called “satisficing.” This allows commanders to modify or reject a course of action, after considering or imagining potential problems. Only if everything seems reasonable will they implement a chosen course of action.

Table 1 – Recognition-Primed Decision (RPD) Model

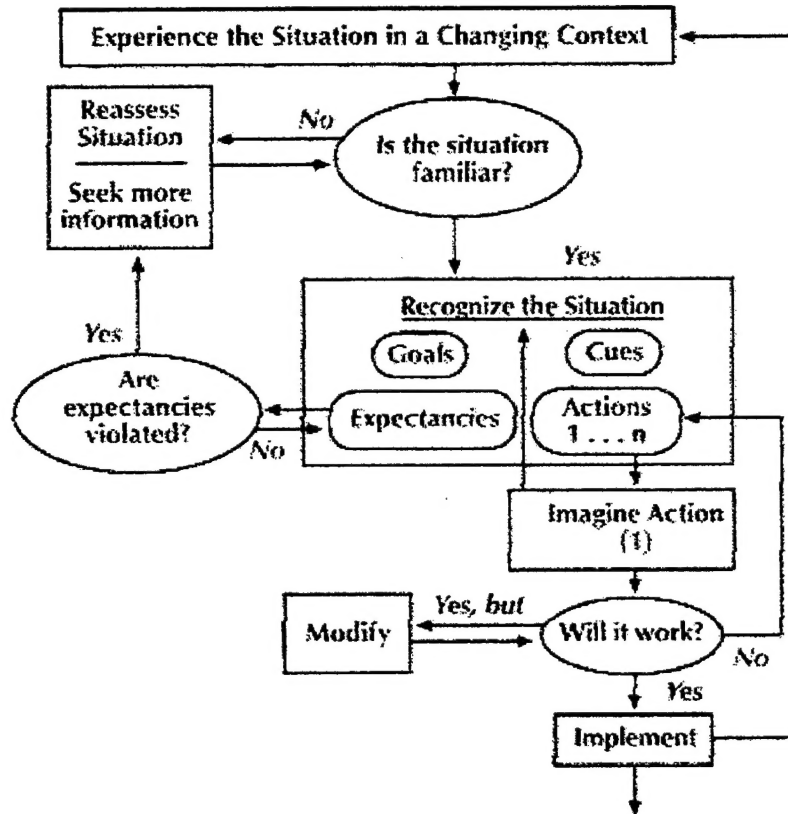


Figure 10.1 Recognition-Primed Decision (RPD) model

ANALYSIS

Friction is the only concept that more or less corresponds to the factors that distinguish real war from war on paper ...

- Clausewitz

In the analysis of the Analytical Decision-Making model verses the Naturalistic Decision-Making model, the major question that needs to be answered is which model do we choose?

With new technologies and the emergence of Network Centric Warfare, the modern battlefield is saturated with an endless stream of information. Logic would suggest that an analytical approach to the decision making process would be more prudent. However, the

factor of uncertainty or “friction” as Clausewitz calls it is inevitable. Analysis works using fixed quantities and overlooks this unpredictable side of war.

No one can gather all the information about a situation. Nor should one try. As they “fight in the fog of war”, commanders are apt to wait for more and more information, delaying decisions in order to obtain conformation of ambiguous intelligence about the enemy and friendly forces. This can lead to a loss of momentum, and may squander a chance to capitalize on a decisive opportunity. Worse, in the lapse of critical time, the enemy could gain the advantage altogether. As John Adair suggests in his book, *Great Leaders*, this is a state of “paralysis by analysis” that is a common failing in leaders who have not learned to be decisive.¹²

Some researchers believe that there is no solution to this dilemma except to rely more on intuitive judgement than on rational calculation. While intuitive judgment is critical, the choice of which decision making model to select is dependent on the situation in which the decision must be made. The time one has to make a decision within a certain situation will influence the decision making process.

Intuition and analysis are not mutually exclusive. Intuition is not opposed to reason; it works with reason in a complementary fashion. Logic and reasoning aid the translation of intuitive thinking into a creative process where it can be articulated and put to use.¹³ When developed to a high degree, this combination of reasoning and intuition allows the commander to “think outside the box”, create new ideas, and overcome the uncertainties of war. His “intuitive” decisions are achieved without conscious reasoning, yet are fully supported by logical and educated training and experience.

Technology has transformed the nature of war but has not altered the one unchanging fundamental of war: the variety and complexity of each situation.¹⁴ In each battlefield scenario, the operational factors of space, time, and force must be analyzed. These factors define the situation. In modern warfare, the factor of time is becoming more and more compressed which directly affects the speed at which decisions must be made.

The major advantage that NDM has over ADM is the factor of speed. The ability to rapidly make decisions before your enemy greatly enhances your chance of victory. If you can move through your OODA loop faster than your enemy does or even disrupt his process, you can limit his ability to act and obtain a decisive advantage. This suggests that NDM is more advantageous when presented with a time critical situation.

Science has also examined "real world" situations in the comparison of NDM verses ADM. Recent research in the field of NDM conducted outside the laboratory, studying naval officers, jet pilots, AWACS weapons directors, and operational commanders revealed that "...under operational conditions, decision makers rarely use analytical methods, and non-analytical methods can be identified that are flexible, efficient, and effective."¹⁵ Additional studies conducted by Dr. Gary Klein and others concluded that decision makers in a variety of fields use the analytical approach to decision-making less than 10 percent of the time and employ intuitive techniques over 90 percent of the time.¹⁶ This would lead us to believe that the formal decision making process taught to our military is not being used.

The analysis of NDM verses ADM is also applicable in determining how decisions are made in a team environment. In more complex organizations, such as, CINC staffs, team decision-making is required. At this level, one would expect to see more comparisons of concurrent options. Once again the situation dictates which decision making model is

emphasized. Normally a staff will have a large amount of time to conduct a systematic and exhaustive analysis of separate courses of action to determine the optimal choice as in the Deliberate Planning Process. This model allows a choice of the optimal course of action to be justified to the commander based on quantifiable facts. In a different situation, Crisis Action Planning may be required. Crisis Action planning is based on current events and conducted in time-sensitive situations.¹⁷ With the factor of time most prevalent in this situation, a greater emphasis should be placed on intuitive decision-making processes.

In the selecting the proper decision making model, the skillful commander will not only assess the situation and determine the operational factors of time, space, and force, but will also employ his experience in the decision making process. This will allow him to incorporate the obvious advantages of both the analytical and naturalistic decision-making models into his decision. From the infantryman on the ground deciding how to take a position to the CINC conducting campaign planning, their decision-making processes must intricately weave intuition and analysis to form a tapestry of decisive vision that no enemy could defeat. This is the mark of a military genius.

INTUITION AND THE COMMANDER

We must gauge the strength and situation of the opposing state. We must gauge the character and abilities of its government and people and do the same in regard to our own. Finally, we must evaluate the political sympathies of other states and the effect the war may have on them. To assess these things in all their ramifications and diversity is plainly a colossal task. Rapid and correct appraisal of them clearly calls for the intuition of a genius; to master this complex mass by sheer methodological examination is obviously impossible.

- Clausewitz

Much commentary has been made on the significance of the military genius. In Clausewitz's view, commanders significantly influence the war's conduct through setting

objectives, combat decision making, and leadership during war's chaos and confusion.¹⁸ Clausewitz divides the characteristics that contribute to the military genius quality into two categories: intellectual and personality. The intellectual characteristic is subdivided into three components: a comprehensive knowledge base, intuition, and sense of locality or situational awareness sometimes referred to as "commander's image." The following focuses on the component of intuition.

Webster's New World dictionary defines intuition as "the immediate knowing of something without the conscious use of reasoning." Intuitively assessing a situation rapidly and accurately gives a great commander the presence of mind to deal quickly and confidently with the unexpected. He is able to make swift and precise decisions in the presence of ambiguous conditions. Countless efforts have been made to reduce the uncertainty or "fog" inherent in war. However, the immutable fact is that the situation of any battle is never completely predictable. Therefore, we must examine and enhance our intuitive abilities to recognize, cope with, and overcome any uncertainty.

Essential to the use of intuition is a comprehensive database of knowledge and experience. Intuition requires a remarkable blend of creativity, skillful reasoning, and foresight that grasp an understanding of the essential elements of warfare and the manner in which these relate to one another.¹⁹ Commanders do not cling to a single technique, theory, or style when others serve equally well to create a decisive vision. They allow intuition to form a comprehensive view of the conflict.²⁰ The corps commander of VII (US) Corps, Lieutenant General Frederick M. Franks, Jr., underlined the fact that he made one of the most important decisions of the ground war using intuition: "I believe in intuition ... I used it when making my decision where and when to hook left to cut off the Republican Guard."²¹

In the midst of what appears to be chaos, there are orderly patterns that are recognizable to the educated eye. Just as a skilled artist can grasp the details of a broad vista, a well-educated military professional can envision the complex and interactive nature of an entire conflict and provide the foundation for decisive results.²² It allows the commander to ask the right questions, be innovative, and ultimately successful on the battlefield.

DEVELOPING INTUITION

With intuition as the basis of Naturalistic Decision-Making and an essential skill required by the commander, we now have to ask the question, "How do we train and develop intuition?"

First, there must be a cultural change within the military to embrace intuition as a viable teaching tool and a willingness to accept change. We have to recognize as an institution that human beings have an intangible capacity for intuition that can outstrip even the most powerful analysis. We have to recognize that even though we cannot fully understand or explain it, this skill can achieve superior results. It is not mystical or merely theoretical. It is real. It is a documented capability of the human mind, and we have to be committed to exploiting and developing it.²³ The problem with developing intuition among our leaders lies in peacetime soldiering which demands, quite understandably, the disciplines of analysis and attention to detail and does not encourage or accept decisions made by intuition. In that environment, intuition is not trusted; therefore, it is not developed as a decision-making technique.²⁴

The military has often taken lessons from the business world. We may want to experiment with this approach again. The Harvard Business School adopted a case study

approach to learning decision making in a business context. Students study over 200 business cases to develop a broad base of the practical understanding of business decision-making.²⁵ The same technique is applied in the Naval War College Strategy and Policy course. We should expound on this technique throughout the services.

Self-study and self-assessment can equally enhance a commander's intuitive skills. The Chief of Naval Operations publishes an excellent recommended reading list for all personnel. This gives a solid foundation, but as General Charles C. Krulak, former Commandant of the Marine Corps, states, "Simply reading history is not enough." We need to read it with an eye toward examining the relevant decision making processes that took place during the particular event.²⁶ Once again, the emphasis being on evaluating the situation, which allows the commander to accurately apply the appropriate decision making model. In investigating self-assessment, Army researchers applied the Myers-Briggs Type Indicator (MBTI) pattern at the highest levels of the military. They concluded that the most desired MBTI pattern for general officers is "NT" (intuitive thinking).²⁷ This is not to say that anyone who is not classified as an "NT" will fail, but it could be used as an indicator to assist in developing intuition. In the words of Sun Tzu, "Know your enemy and know yourself; in a hundred battles you will never be in peril. When you are ignorant of the enemy but know yourself, your chances of winning or losing are equal."²⁸

Inherent in the development of intuition is experience. A broad base of experience is essential to the coup d'oeil or skill for pattern recognition that is in turn the basis for intuitive decision-making; the way to improve intuitive decision-making is to improve pattern recognition; the way to improve pattern recognition is to improve the experience base.²⁹

Commanders can gain a supportive experience base by immersing themselves in numerous decision-making situations. An excellent example of training the decision making process is the Tactical Decision Games published in *The Marine Corps Gazette*. Simulations allow for a wide variety of situations in which a commander can acquire experience. Over time, simulations expand a commander's pattern recognition ability, thus improving his intuitive decision making skills.

Dr. Gary A. Klein and John F. Schmitt aptly describes the irony in understanding and developing and applying the intuitive decision making process.

Intuitive decision-making is a worthy goal, but there is an irony to it, [because] intuition is based on experience. So we can conclude that as we move down the chain of command to the level of company grade officers and noncommissioned officers (NCOs), the quality of intuition will be correspondingly degraded as the level of experience decreases. Unfortunately, the further down the chain we look, the more likely it is that leaders will find themselves in situations requiring rapid decisions. Historically, commanding generals rarely, if ever, find themselves having to make immediate decisions everyday. So, the leader with the most highly developed intuition – the general – rarely uses that talent, while the leader whose need for intuition is greatest – the NCO – lacks the requisite experience.

CONCLUSION

In a final analysis, the operational commander makes decisions dependent on the situation he is facing. Analytical Decision-Making works when time is not a factor. It can provide an optimal decision for a course of action based on situational certainty and accurate information. But these situations of certainty and accuracy are rare. I contend that commanders of today and future commanders need to understand and incorporate the intuitive Naturalistic Decision-Making process. It provides the advantage of speed, intuition, creativity, tolerance of uncertainty, and the ability to visualize the problem and its solution.

In conducting a Commander's Estimate of the Situation, do commanders conduct an analytical decision-making process to determine the best course of action or is it conducted to justify what they intuitively know is the best course of action from the beginning?

Today ill-structured, situation unique problems; uncertain, dynamic environments; shifting, ill-defined goals; lack of information; ongoing action with continuous feedback loops; high-level stress and friction; and time stress characterize conflicts. The intuitive decision-making inherent in the Naturalistic Decision-Making process provides a sound basis for determining a proper course of action for a given situation.

This paper is not designed to espouse that analytical decision-making processes be forgotten. It is to present the idea that there are other ways to make decisions and these processes need to be explored, cultivated, and incorporated into the educational syllabus of our leaders. As our doctrine moves toward maneuver warfare with an emphasis on speed, intuitive decision-making provides another tool in the commander's toolbox to cope with an ever-changing world.

In a final analogy to convey the differences, compatibility, and use of Analytical Decision-Making verses Naturalistic Decision-Making, a comparison between a football coaches called play and a quarterbacks audible is presented. It is first and ten and the coach determines a play as the situation dictates. He has formed an overall game plan from his vision of what he wants to do based on an exhaustive analysis of the opponent's tendencies. He has scrutinized the opponent's strengths and weaknesses and determined the best plan to exploit their weaknesses and play his strengths. The quarterback has studied the game plan, practiced it all week, and understands the overall strategy. As the quarterback breaks the huddle and surveys the defense, he may encounter a completely different defense than

expected. He notices eight defenders on the line of scrimmage. The coach called a run play that will not work against an eight-man front. The play clock is winding down and the quarterback calls an audible that will take advantage of the defensive set presented to him. The quarterback executes a play-action pass run from the formation sent in by the coach. Everything works perfectly and the result – six points.

This illustrates that every decision is determined by a situation. A commander cannot regiment him or herself to one set process. The astute commander – the military genius – will use both the left and right side of the brain to provide the optimal solution.

NOTES

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- ¹ John F. Schmitt, "How We Decide," Marine Corps Gazette, October 1995, 16.
- ² Charles C. Krulak, "Cultivating Intuitive Decisionmaking," Marine Corps Gazette, May 1999, 19.
- ³ George E. Reactor, Jr., "Leadership and Decisionmaking," Marine Corps Gazette, October 1995, 21.
- ⁴ Ibid.
- ⁵ Krulak, 19.
- ⁶ Schmitt, 16.
- ⁷ Ibid.
- ⁸ Ibid., 17.
- ⁹ Ibid., 18.
- ¹⁰ Gary A. Klein, "Strategies of Decision Making," Military Review, May 1989, 58.
- ¹¹ Gary A. Klein, Sources of Power: How People Make Decisions (Cambridge, MA: MIT Press, 1998), 24.
- ¹² Charles T. Rogers, "Intuition: An Imperative of Command," Military Review, March 1994, 44.
- ¹³ Lamar Tooke and Ralph Allen, "Strategic Intuition and the Art of War," Military Review, March-April 1995, 14.
- ¹⁴ Ibid., 13.
- ¹⁵ Gary A. Klein and David Klinger, "Naturalistic Decision-Making," Crew System Ergonomics, Winter 1991, 2.
- ¹⁶ Schmitt, 18.
- ¹⁷ Joint Chiefs of Staff, Joint Doctrine for Planning Joint Operations (Joint Pub 5-0) (Washington, D.C.: April 13, 1995), I-10.
- ¹⁸ Thomas H. Killion, "Clausewitz and Military Genius," Military Review, July-August 1995, 97.
- ¹⁹ Tooke and Allen, 16.
- ²⁰ Ibid., 12.
- ²¹ Rogers, 42.
- ²² Tooke and Allen, 12.
- ²³ Schmitt, 19.
- ²⁴ Rogers, 39.
- ²⁵ Schmitt, 19.
- ²⁶ Krulak, 21.
- ²⁷ James J. Tritten, "Intuitive Combat Decisionmaking," Marine Corps Gazette, April 1996, 30.
- ²⁸ Sun Tzu, The Art of War, trans. Samuel B. Griffith (London: Oxford University Press, 1971), 84.
- ²⁹ Tooke and Allen, 18.

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